
**Machinery for forestry — Safety
requirements and testing for
pole-mounted powered pruners —**

Part 1:

**Machines fitted with an integral
combustion engine**

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*Matériel forestier — Exigences de sécurité et essais pour les perches
élagueuses à moteur —*

Partie 1: Machines équipées d'un moteur à combustion interne intégré
ISO 11680-1:2011

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11680-1 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 17, *Manually portable forest machinery*.

This second edition cancels and replaces the first edition (ISO 11680-1:2000), which has been technically revised to reflect the state of the art.

ISO 11680 consists of the following parts, under the general title *Machinery for forestry — Safety requirements and testing for pole-mounted powered pruners*:

— Part 1: *Machines fitted with an integral combustion engine*

— Part 2: *Machines for use with back-pack power source*

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Introduction

This document is a type-C standard as stated in ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the scope of this document.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the requirements of this type-C standard.

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Machinery for forestry — Safety requirements and testing for pole-mounted powered pruners —

Part 1: Machines fitted with an integral combustion engine

1 Scope

This part of ISO 11680 gives safety requirements and measures for their verification for the design and construction of portable, hand-held, pole-mounted powered pruners having an integral combustion engine as their power unit and using a drive shaft to transmit power to a cutting attachment consisting of a saw chain or a reciprocating or circular saw blade with a 205 mm maximum outside diameter. Methods for the elimination or reduction of hazards arising from the use of these machines and the type of information on safe working practices to be provided by the manufacturer are specified.

This part of ISO 11680 deals with all significant hazards, hazardous situations or hazardous events with the exception of electric shock from contact with overhead electric lines (apart from warnings and advice for inclusion in the instruction handbook), relevant to these machines when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer.

NOTE See Annex A for a list of significant hazards.

This part of ISO 11680 is applicable to portable, hand-held, pole-mounted powered pruners manufactured after its date of publication.

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2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6531, *Machinery for forestry — Portable chain saws — Vocabulary*

ISO 7112:2008, *Machinery for forestry — Portable brush-cutters and grass-trimmers — Vocabulary*

ISO 7113:1999, *Portable hand-held forestry machines — Cutting attachments for brush cutters — Single-piece metal blades*

ISO 8893, *Forestry machinery — Portable brush cutters and grass-trimmers — Engine performance and fuel consumption*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs*

ISO 14982:1998, *Agricultural and forestry machinery — Electromagnetic compatibility — Test methods and acceptance criteria*

ISO 22867, *Forestry and gardening machinery — Vibration test code for portable hand-held machines with internal combustion engine — Vibration at the handles*

ISO 22868, *Forestry and gardening machinery — Noise test code for portable hand-held machines with internal combustion engine — Engineering method (Grade 2 accuracy)*

IEC 60745-1:2006, *Hand-held motor-operated electric tools — Safety — Part 1: General requirements*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 6531, ISO 7112 and ISO 12100 and the following apply.

3.1 pole-mounted powered pruner
machine whose power source is attached via a long drive-shaft tube (pole) to a cutting attachment, designed to enable an operator to cut branches from a distance

NOTE See Figure 1 for an example of a pole-mounted powered pruner with integral combustion engine and a saw-chain cutting attachment within the Scope of this part of ISO 11680.

4 Safety requirements and/or protective measures

4.1 General

Machines shall comply with the safety requirements and/or protective measures of this clause. In addition, the machine shall be designed according to the principles of ISO 12100 for relevant but not significant hazards which are not dealt with by this part of ISO 11680.

The safe operation of a pole-mounted powered pruner also depends on the safe environment associated with the use of personal protective equipment (PPE), such as gloves, slip-resistant footwear, and eye, hearing and head protective equipment, as well as safe working procedures (see 5.1).

Except where otherwise specified in this part of ISO 11680, the safety distances specified in ISO 13857:2008, 4.2.4.1 and 4.2.4.3, shall be met.

4.2 Hand-grips

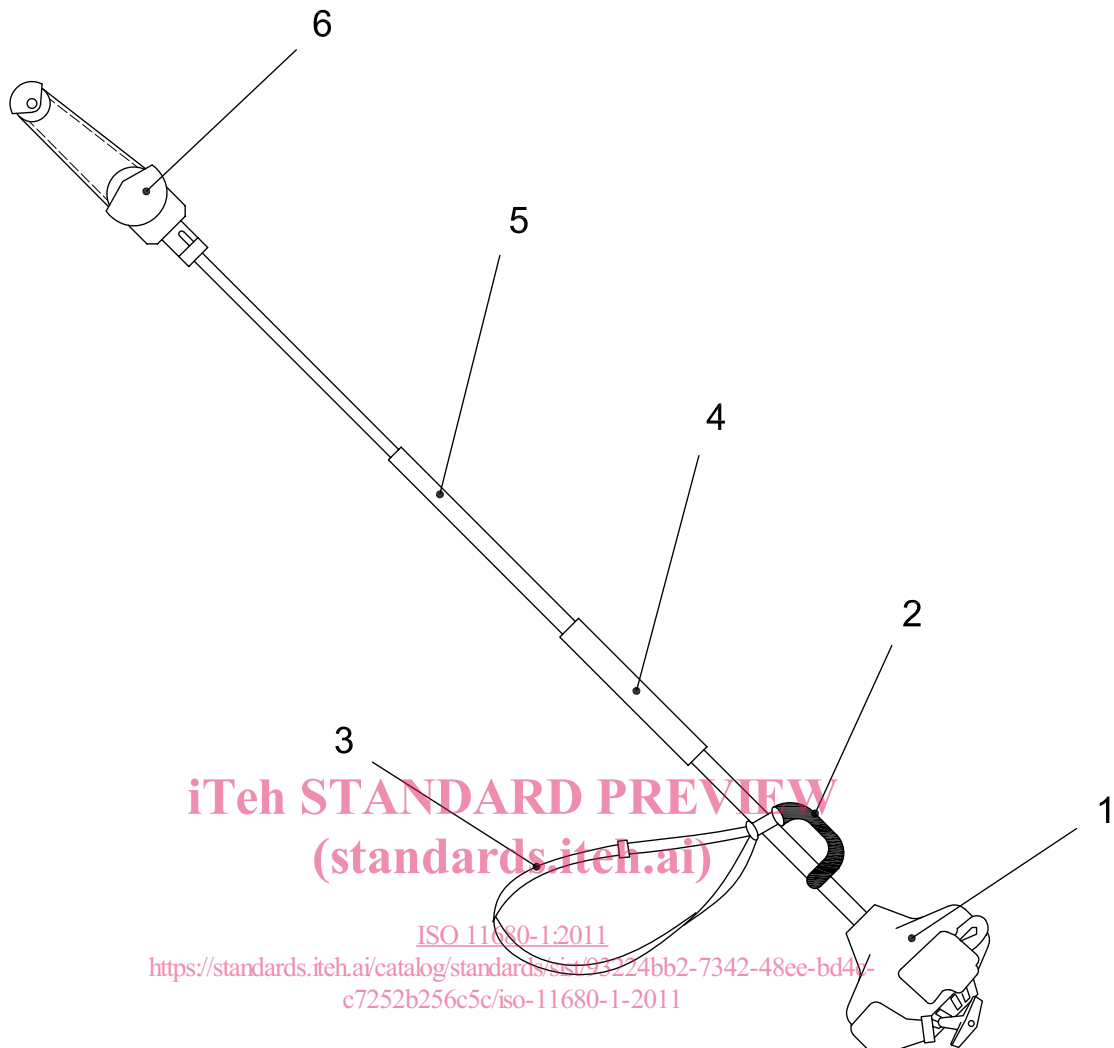
4.2.1 Requirements

The machine shall have a hand-grip for each hand. The shape and surface of the hand-grip shall be designed so as to provide the necessary sureness of grip, regardless of whether or not the operator wears gloves. If the hand-grip nearest the cutting attachment is an integral part of the drive-shaft tube, the diameter shall be between 20 mm and 50 mm. The hand-grip length shall be at least 100 mm.

The gripping length of a bail or closed hand-grip shall comprise any length that is straight or curved at a radius greater than 100 mm together with any blend radius, but not more than 10 mm, at one or both ends of the gripping surface.

4.2.2 Verification

The design and dimensions shall be verified by inspection and measurement.



Key

- 1 power unit
- 2 rear hand-grip
- 3 harness
- 4 front hand-grip
- 5 shaft tube
- 6 cutting attachment

Figure 1 — Example of pole-mounted powered pruner with integral combustion engine and saw-chain cutting attachment

4.3 Harness

4.3.1 Requirements

All machines shall be equipped with a harness to be worn by the operator. The harness is primarily for supporting the machine during movement between cutting tasks and for reducing the risk of unintentional contact with the cutting attachment. The harness shall be adjustable to the size of the operator.

A harness shall either be provided with a quick-release mechanism or the design shall be such that the harness can be removed quickly in the event of an emergency. Any such quick-release mechanism for emergency release shall enable rapid release of the machine from the harness or harness from operator.

If a quick-release mechanism is provided, it shall be possible to open it under load and release the machine using only one hand.

4.3.2 Verification

The harness, its functionality and its adjustment shall be verified by inspection. The quick-release mechanism shall be checked by a functional test carried out by a person wearing the harness and with a vertical load of three times the dry weight of the machine acting on the suspension point.

4.4 Cutting attachment

4.4.1 Saw-chain cutting attachment

4.4.1.1 Requirements

Saw-chain cutting attachments shall be provided with a means of adjustment to achieve chain tension in accordance with the instruction handbook. The method of ensuring chain tension shall be described in the instruction handbook.

Means shall also be provided to lubricate the saw chain, either automatically or manually. If a manual oiler is provided, it shall be located so that it can be operated while the machine is held by both hand-grips.

4.4.1.2 Verification

Means for adjustment and lubrication of the saw chain shall be verified by inspection and functional testing.

4.4.2 Circular saw-blade cutting attachment

4.4.2.1 Requirements

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The circular saw blade shall be a single-piece blade in accordance with the specifications for blade surface quality and blade material given in ISO 7113.

The circular saw blade shall be secured so as to prevent relative motion between it and the retainer or the shaft on which it is mounted. The method for securing the saw blade shall also prevent its loosening during use.

These requirements are applicable to all saw blades recommended by the instruction handbook.

4.4.2.2 Verification

The method of attachment shall be verified by inspection and the following test procedure.

- a) Install the cutting attachment in accordance with the instruction handbook.
- b) Lock the power transmission shaft.
- c) Apply to the blade a rotational torque, *M*, in newton metres (N · m):

$$M = 0,4 \times V \times k$$

where

V is the engine displacement, in cubic centimetres (cm³);

k is the gear ratio (engine/blade rotational frequency).

- d) Conduct the test five times in the direction of normal rotation, then five times in the opposite direction.

Blade surface quality and blade material shall be verified in accordance with ISO 7113.

4.4.3 Cutting attachment strength

4.4.3.1 Requirements

Recommended cutting attachments and their fixing systems and guards shall not break or crack after impact with a hard surface when subjected to the functional test specified in 4.4.3.2.

4.4.3.2 Verification

Suspend the machine freely from a position $150 \text{ mm} \pm 2 \text{ mm}$ in front of the middle of the rear handle and at a height of $775 \text{ mm} \pm 2 \text{ mm}$ above the test surface.

Allow the machine to swing freely once around the point of suspension from a start position in which the machine is at an angle of $45^\circ \pm 2^\circ$ to the horizontal. The test surface with which the machine impacts shall be flat and of concrete or similar.

If, after impact, no cracks can be detected in the cutting attachment or its fixing or guard by means of visual inspection, start the engine and run at an over-speed of 133 % of the maximum power speed or maximum engine speed — whichever is the lesser — for $60 \text{ s} \pm 2 \text{ s}$. Control the engine speed using the throttle trigger. If the saw blade or guide bar is so bent as to be unusable, replace it before the over-speed run.

Impact strength is considered to have been successfully verified if no parts of the cutting attachment have been ejected and no cracks can be detected during visual inspection. Failure in the drive mechanism is not considered as being failure of the test.

Single-piece metal blades shall also be verified by testing in accordance with ISO 7113:1999, Clause 5.

4.5 Transport cover for cutting attachment

4.5.1 Requirements

The machine shall be provided with a transport cover, so designed that it remains attached to the cutting attachment during transport and storage.

4.5.2 Verification

The attachment of the transport cover to the cutting attachment shall be verified by inspection when holding the machine in any direction.

4.6 Distance to cutting attachment

4.6.1 Requirements

The distance from the rear of the throttle trigger to the nearest unguarded point of the cutting attachment shall be at least 1 250 mm, with the cutting attachment adjusted to its position nearest the operator.

If the location of the throttle trigger is adjustable, any adjustment below the distance of 1 250 mm shall be prevented by design.

This minimum distance from the rear of the throttle trigger to the nearest unguarded point of the cutting attachment shall apply to all cutting attachments recommended by the manufacturer.

A fixed obstacle (e.g. collar on the shaft tube) shall be provided close to the cutting attachment to warn the operator that his hand is getting close to the cutting device. The distance from the rear of the fixed obstacle to the nearest unguarded point of the cutting attachment shall be at least 120 mm, measured as a chain measurement.